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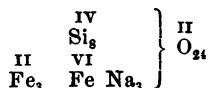
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acids at ordinary pressure, and very slowly in sealed tube. Composition—

SiO ₂	=	49.83
TiO ₂	=	1.43
ZrO ₂	=	0.75
Al ₂ O ₃	=	trace
Fe ₂ O ₃	=	15.88
FeO	=	17.95
MnO	=	1.75
Na ₂ O	}	= 8.33
LiO		
K ₂ O	=	1.44
MgO	=	0.41
Ignition	=	0.20
		97.97

Atomistic symbol—



3. *Zircon* occurs in tetragonal forms of the combination P. ∞P. 0 P. Basal plane noticed on all crystals. Color, iron-gray; after treating with hydrochloric acid, of a yellowish flesh-color.

Specific gravity at 12° C. = 4.538.

Composition—

SiO ₂	=	29.70
ZrO ₂	=	60.98
Fe ₂ O ₃	=	9.20
MgO	=	0.30
		100.18

The material for analysis was boiled as powder with hydrochloric acid, until no iron was dissolved. This zircon is, therefore, characterized by an exceptionally high percentage of iron.

The material for examination was furnished by Dr. Foote.

JANUARY 16.

The President, Dr. RUSCHENBERGER, in the chair.

Forty-one members present.

Fertilization of Browallia elata.—The following communication from Dr. ASA GRAY was read at his request by Mr. Thos. Meehan:—

In a paper communicated to the Academy of Natural Sciences, and printed in the "Proceedings" under date of Feb. 8, 1876, Mr. Meehan, upon exhibiting specimens of *Browallia elata* which had

flowered in a green house, and set seed in winter, added the following among other remarks:—

“Not only was it a fact that this plant, with such an attractive blue color, perfected every seed-vessel without insect aid, but the *structure of the flower was such that should any insect endeavor to collect the pollen it would only aid, if that were necessary, in self-fertilization.* The stigma was nearly the length of the corolla-tube; and the anthers, a trifle longer, were arranged closely around it. Two of these were inverted just over the stigma, their backs being densely bearded, and appearing to the naked eye like petaloid processes, effectually closing the mouth of the throat. *No insect could thrust its proboscis into the tube except through this dense bearded mass, and if it had foreign pollen, would be thoroughly cleaned by the beard; but the very act of penetration would thrust these anthers forward on to the pistil, and thus aid in rupturing the pollen-sacs, and of course the self-fertilization of the flower.*”

I have italicized the passages which attracted my attention when I first read this paper in August, and which led me to make some observations for myself. In consequence, when I afterward read a reproduction of this statement in *Nature*, I was constrained to address a note to that paper, in which I expressed the opinion that, as to this matter, Mr. Meehan's observation was incomplete and his inference hasty, or some word to that effect. I have not the printed note before me. In it I stated, simply and substantially, that the throat of the corolla was found by me to be pervious by an orifice or chink directly in front of each of these bearded anthers; that a hog's bristle thrust down these passages, after being slightly moistened, had the inserted portion well supplied with adherent pollen when withdrawn, and that this could be reinserted into another corolla (removed from the plant) without being cleaned off by the beard. I also explained that the structure and collocation of the stigma and upper anthers were such that, in my opinion, the action of an insect would not tend to thrust any pollen of the former upon the actual stigma. I added that the flowers in question were freely visited by Hymenoptera and Lepidoptera of various sorts.

In *Nature* for Dec. 14, I find a rejoinder from Mr. Meehan, which makes (so far as I am concerned) the following points:—

1. Prof. Gray should have noticed that the original observation was made upon a green-house plant in winter, and should have understood the phrase, “*Browallia* is not visited by insects, yet seeds abundantly,” to refer only to this condition.

2. “That even though an insect were as careful in finding the chink as Dr. Gray was in his manipulations with the hog's bristle, the obstruction of the mouth in the way it is cannot surely be claimed as an arrangement in favor of cross-fertilization.”

We need not trouble *Nature* any further with this little discus-

sion, and any amends that may be due to Mr. Meehan may be made here; wherefore let me say that I never presumed to question Mr. Meehan's *fact*, viz., that his plant of *Browallia* seeded in winter without insect aid, but only his *inference*, viz., that *Browallia* flowers, on account of their structure, could not or would not in the natural course of things be cross-fertilized by insects. This being understood, it will be apparent:—

1. That I had no occasion to refer to the season in which Mr. Meehan's observation was made and his paper read. That is relevant to the matter I had in hand only as confirming my remark that the observation was incomplete and inference hasty, as the ensuing summer showed.

2. The "obstruction" referred to "surely" was not "claimed as an arrangement in favor of cross-fertilization." The point made was that no obstruction to cross-fertilization exists.

Mr. THOMAS MEEHAN said he was quite willing to grant the correctness of Dr. Gray's point that it was not absolutely impossible that *Browallia* should be once in a while fertilized by an insect in the way suggested. The great object he had had in view in all his papers and remarks on this subject, was anything but to argue against the possibilities of these occasional acts. At the outset of his course on this question, he found Mr. Darwin saying that clover would not fertilize without the aid of the humble bee; and we know the row of consequences built on this supposed fact, that if cats no longer existed, clover would disappear from England. Dr. Gray, himself, in playful earnestness, had suggested as a further disaster, that if there were no old maids to care for the cats, it would be bad for the clover. He had found the whole subject formulated in this wise: all plants with inconspicuous, odorless flowers, are fertilized by the wind; all flowers with color, fragrance, or sweet secretions, are fertilized by insects. Sir John Lubbock expressly declares that "to the unconscious agency of insects, plants owe their color and fragrance." Professor Gray, himself, before the Mount Holyoke Seminary, the year before last, is reported in the *Scientific Farmer* to have said, "Nature abhors in-and-in breeding; and, like a wise teacher, shuns the practice." It is also on record in the *Proceedings*, that when he had shown that many composites, *Staphylea* and others, did fertilize themselves, Dr. Gray objected to the whole argument. His (Mr. M.'s) point had been, that Nature did not shun the practice of self-fertilization in flowers; and not by any means that cross-fertilization by insect agency under no circumstances occurred. Professor Gray, in a recent paper, had modified these views. He there stated his position to be now, that plants abhor *perpetual* in-and-in breeding; that Nature says to the plant, "Get cross-fertilized if you can, but anyhow get fertilized;" and admits that cross-fertilization is the great exception to the rule. Of course,

this destroys all the practical sequences, from old maids to fertile clover, for at that time it was thought clover had no choice but to wait the pleasure of the humble bee. There was now nothing left to him to object to, except the interpretation of these exceptional cases of cross-fertilization. He really thought that "exceptional crossing," as a factor in the development of species, involved more difficulties than the "general" theory did; but that was a question for the future. For the present, he was willing to admit that if there was anything in the whole context of his *Browallia* communication indicating that it was impossible under any circumstances that an insect should cross-fertilize it, his friend, Dr. Gray, had the best of that argument.

On the Hudson River and Utica Slates of Pennsylvania.—Prof. PERSIFOR FRAZER, JR., remarked that it always must be one of the principal objects of a geological survey to restrain people from investing their capital where there is a practical certitude that they will have no return. Probably till the end of our race the investment in pyrites for gold and quartz for diamonds will continue, in spite of the diffusion of knowledge. In Pennsylvania the most fatal delusion is found in the black slate beds of No. 3, (or the Hudson River Slates and Utica Slates, called also Matinal by Rogers). This is because these slates occur frequently at no great geographical distance from the true coal measures, because the slates are unusually black and really somewhat carbonaceous, and because their slickensides frequently impart to certain surfaces a lustre not unlike that of some Schuylkill County anthracite. Rogers (vol. i. p. 239), in speaking of these slates, says: "I regard the thin bed of brownish carbonaceous slate" (the equivalent of the Utica Slate of New York) . . . "as probably representing the" (lower) "margin of the formation."

Again (Ibid. p. 260), in speaking of the Matinal Slates of the Kittatinny Valley near Dublin Gap, he says: "Some bands of the slate, particularly those lying adjacent to the limestone, are highly carbonaceous and of a dark color, somewhat resembling the slates of the coal measures. This analogy in their appearance, notwithstanding the conclusiveness of all geological evidence to the contrary, induces many persons not familiar with the geology of the country" (sic.) "to suppose that the formation may actually contain coal. For the last fifty years" (1858) "excavations have from time to time been made at various places in the valley, in the confident belief that coal will be discovered, and though in every instance unsuccessful, they are still occasionally renewed." The same work (p. 472) reaffirms the same view with regard to the place in the series of this black belt.

On p. 480 Mr. Rogers says: "At Copeland's Mill" (Kishacoquillas Valley) "the lower beds of the slate are so black as to have seduced proprietors into an unavailing search for coal. It is the matinal black slate, and of course cannot indicate coal."